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Unconventional Choices for Unconventional Times: Credit and Quantitative Easing in Advanced Economies

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**Unconventional Choices for Unconventional Times:
Credit and Quantitative Easing in Advanced Economies¹**

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With policy rates close to the zero bound and the economies still on the downslide, major advanced country central banks have had to rely on unconventional measures to stabilize financial conditions and support aggregate demand. The measures have differed considerably in their scope, and have inter alia included broad liquidity provision to financial institutions, purchases of long-term government bonds, and intervention in key credit markets. Taken collectively, they have contributed to the reduction of tail risks following the bankruptcy of Lehman Brothers and to a broad-based improvement in financial conditions. Central banks have adequate tools to effect orderly exit from exceptional monetary policy actions, but clear communication is central to maintaining well anchored inflation expectations and to ensuring a smooth return to normal market functioning.

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CONTENTS

| | PAGE |
|--|------|
| I. Introduction | 4 |
| II. Options for Unconventional Monetary Policy | 7 |
| III. Measures Taken by G-7 Central Banks | 11 |
| IV. Effectiveness of Unconventional Policies | 19 |
| V. Exit Strategy..... | 28 |
| VI. Conclusion | 32 |

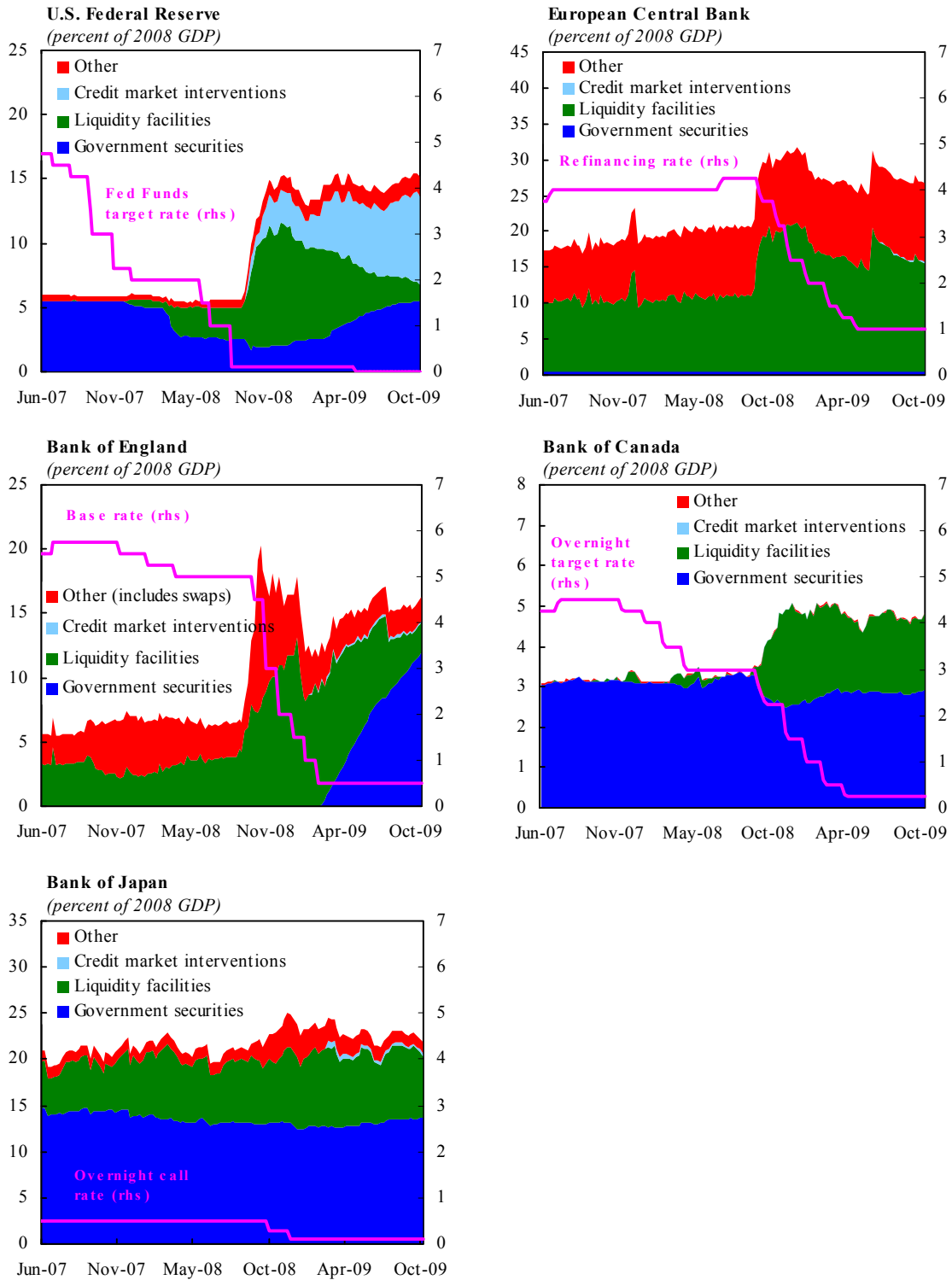
I. INTRODUCTION

1. During the escalating stages of the current economic and financial crisis, advanced country central banks faced difficult choices. Even as the signs of stress appeared in the financial system in the second half of 2007, the problems were perceived to be limited to a few isolated markets, and the main concern at the systemic level was about liquidity. Although uncertainty about the size and distribution of losses on subprime mortgage securities raised concerns about counterparty risk and increased the price of and reduced the availability of interbank financing, few people called into question the solvency of the financial system as a whole. At the same time, even as growth started to slow down, inflation spiked, driven by a significant increase in commodity prices.

2. The central banks reacted to the ensuing financial stress by raising the scale of their liquidity-providing operations. At the same time, they sought to control the macroeconomy through conventional means—by adjusting policy interest rates. Hence, they sterilized their liquidity provision to individual institutions through open-market operations, altering primarily the composition but not the size of their balance sheets (Figure 1). Actions on the policy rate front diverged substantially during the first year of the crisis, reflecting the differences in central banks' assessment of relative risks to growth and inflation and the impact of the financial crisis on the cost and availability of credit. At one extreme, the U.S. Federal Reserve (Fed) cut its policy rate quite aggressively² to offset the impact of elevated spreads on market rates, while at the other extreme the European Central Bank (ECB) raised its main refinancing rate $\frac{1}{4}$ percentage point in July 2008 out of concern about rising inflation expectations (Trichet, 2009b).

² The target for the federal funds rate was reduced by 325 bps to 2 percent between September 2007 and April 2008. Also, the spread between the primary discount window rate and the policy rate was cut to 25 bps from the usual 100 bps within this time period.

Figure 1. Evolution of Central Bank Assets and Policy Rates



Sources: Haver Analytics and Bank of England.

3. When the crisis intensified sharply after the bankruptcy of Lehman Brothers and near-failure of several other major financial institutions in September 2008, the central banks found their traditional tools to be insufficient to deal with the collapse of aggregate demand and freezing of key credit markets. Even a precipitous reduction of policy rates close to effective lower bounds proved insufficient to stimulate the economy given the size of the shock, the offsetting impact of a drop in inflation expectations on the real rates, and the disruptions in the transmission mechanism from policy rates to private borrowing rates and the real economy. With the capital adequacy of systemically important financial institutions called into question and wholesale funding markets under stress, commercial banks tightened their lending standards considerably. Nonbank financing, particularly via private-label securitization, virtually came to a halt. Access to credit for households and businesses was severely curtailed, while its cost ratcheted up.

4. In these circumstances, policymakers undertook a number of decisive measures to try to stabilize financial markets and institutions and prevent a severe and prolonged contraction in real activity. Steps were taken to guarantee bank liabilities, to recapitalize financial institutions, and to limit portfolio losses. Large fiscal stimulus packages were adopted to bolster aggregate demand.

5. Central banks acted nimbly, decisively, and creatively in their response to the deepening of the crisis. They embarked on a number of unconventional policies, some of which had been tried before, while others were new. They increased dramatically the size and scope of their liquidity operations. To varying degrees, they all provided direct support to credit markets, while several of them purchased government bonds. In the process, central banks significantly grew the size of their balance sheets. In addition, some of them made a conditional commitment to keeping the policy rate low for an extended period of time.

6. This paper examines the unconventional monetary policy actions undertaken by G-7 central banks and assesses their effectiveness in alleviating financial market pressures and facilitating credit flows to the real economy. Section II considers the menu of options for unconventional tools of monetary policy. Section III discusses the approaches pursued by major advanced country central banks to resolve the crisis. Section IV provides a discussion of the effectiveness of these approaches, by examining their impact on key financial market indicators. Section V looks into the issues relating to the exit from large-scale central bank interventions. Section VI contains concluding remarks.

II. OPTIONS FOR UNCONVENTIONAL MONETARY POLICY

7. When policy rates are close to the zero bound, central banks can provide additional monetary stimulus through four complementary means.³ First, they could commit explicitly to keeping policy rates low until the recovery firmly takes hold, with a view to guiding long-term interest rate expectations. Second, monetary authorities could provide broad liquidity to financial institutions to give them resources to on-lend to businesses and consumers. Third, central banks could seek to affect the level of long-term interest rates across a wide range of financial assets, independent of their risk, by lowering risk-free rates through the purchase of treasury securities. Fourth, they could intervene directly in specific segments of the credit markets by providing loans to nonfinancial corporations, by purchasing private assets, or by furnishing loans linked to acquisition of private-sector assets—e.g., when investors have to pledge particular types of assets as collateral to obtain central bank loans.⁴

8. These approaches differ in their mechanics and economics.

- An explicit commitment to keeping short-term interest rates low is aimed at anchoring market expectations that monetary stimulus will not be withdrawn until durable recovery is in sight. A commitment to keeping short-term interest low should keep inflation expectations from declining, preventing a rise in real interest rates and bolstering demand.
- Provision of extraordinary amounts of low-cost financing to financial institutions can be done through existing or new facilities. Heightened concerns about counterparty credit risk, uncertainty regarding an institution's own short-term financing needs, uncertainty regarding the value of a firm's assets that could be used as collateral, and the limited supply of high-quality collateral may constrain banks' ability and/or willingness to lend, including to each other, beyond the shortest maturities. Under these circumstances, central banks may alleviate these constraints by enhancing their liquidity providing operations beyond their traditional open-market and lender of last resort facilities. Central banks could lend funds to financial institutions at longer maturities, and broaden the quality of collateral that they would accept. They can expand the reach of their operations to a wider set of financial institutions. By enlarging the pool of the collateral accepted for central bank operations, financing by

³ Box 1 discusses various terms used to describe unconventional monetary policies, including *quantitative easing* and *credit easing*.

⁴ The list is not exhaustive. For example, for a small open economy experiencing an isolated downturn, pushing down the value of its currency has been advocated. Such policy would clearly be unwelcome at the time of a global recession. Also, after a deflationary shock, real interest rates are likely to be lower for a given policy rate under price-level-path targeting, thus providing more stimulus to the economy (Decressin and Laxton, 2009). However, switching to a different monetary policy regime in the middle of a crisis is hardly feasible.

banks to the related sectors can be facilitated and could be reflected in the credit spreads that banks charge to these sectors.

- Purchasing longer-term government securities is aimed at reducing long-term private borrowing rates. This mechanism may be employed when short-term policy rates are near their lower bound and (explicit or implicit) commitment to keep policy rates low does not effectively translate into lower long-term interest rates. Because long-term treasuries serve as benchmarks for pricing a variety of private-sector assets, it is expected that interest rates on privately issued securities and loans would also decline as government bond yields decline. In addition, banks could use the proceeds from treasury sales to extend new credit. That said, banks may choose to keep these additional funds in their reserve accounts at the central bank, even when reserves earn low or zero interest, if they perceive profitable lending opportunities to be limited and have a desire to have ready access to liquidity due to an uncertain economic and financial backdrop.
- Credit market interventions involve direct support by the central bank in specific segments of credit markets that may be experiencing dislocations. The central bank's support may help alleviate illiquid trading conditions, reduce liquidity premiums, help establish benchmark prices, and encourage origination in the targeted market through the purchase of commercial paper, corporate bonds and asset-backed securities. Alternatively, the central bank can provide credit to financial institutions or other investors for the purpose of purchasing particular private securities. One mechanism to make certain the funds are used for the intended purpose is to require that the eligible securities be posted as collateral, with overcollateralization protecting the central bank against losses and ensuring the investors share any potential losses in the collateral's value. Credit market interventions can generally be useful not only at near-zero, but also at above-zero levels of the short-term nominal interest rate if continued dislocations in the targeted markets are deemed to pose wider threats to the financial or credit system.

Box 1. Nomenclature of unconventional measures

The discussion of unconventional approaches is often rendered confusing by inconsistent terminology. In particular, the debate is frequently couched in terms of *quantitative easing* (QE) vs. *credit easing* (CE). However, there are no generally accepted definitions for these two terms. Moreover, various choices cannot be reduced to just two options. While the main text introduces our taxonomy of measures, this box discusses commonly used phraseology.

The Bank of Japan undertook a variety of unconventional policies between 2001 and 2006 under the heading of *quantitative easing*. A key feature of that approach was targeting the amount of excess reserves of commercial banks, primarily by buying government securities, and most commentators equate this feature with QE.

Federal Reserve Chairman Bernanke (2009) contrasted that experience with the Fed’s current approach, which he classified as *credit easing* (CE). He defined credit easing to encompass all Fed operations to extend credit or purchase securities. Bernanke stressed that the focus of CE was on individual markets—and hence the composition of the Fed’s balance sheet, with its size being largely incidental, as opposed to the emphasis on the size under QE.

Subsequently, however, many commentators started using the term QE to mean purchases of long-term government securities and CE to mean acquisition of private assets, with agency bonds and mortgage-backed securities falling into a somewhat gray area. On the other hand, Buiters (2008) defined quantitative easing as operations to expand the monetary base and coined the term “qualitative easing” to mean a shift in the composition of central bank assets (toward less liquid and riskier ones) holding constant their total size.

The Bank of Canada (2009) refers to the purchase of government or private securities financed by creation of reserves as QE and to the acquisition of private assets in certain key markets as CE. Defined in this way, the two approaches are not mutually exclusive. Specifically, credit easing may or may not result in central bank balance sheet expansion depending upon whether its impact on reserves is sterilized. To the extent we use the terms QE and CE in this note, we employ the Bank of Canada’s definitions.

Bank of England (BoE) Governor King (2009) made a distinction between “conventional unconventional” policy—purchases of highly liquid assets, such as government bonds, to boost the supply of money—and “unconventional unconventional” measures, aimed at improving liquidity in certain credit markets through targeted asset purchases. The former corresponds to the more conventional way to conduct quantitative easing, while the latter meets our definition of credit easing.

The ECB has eschewed QE and CE labels, and has dubbed its approach—centered on ample liquidity provision to Eurozone banks—*enhanced credit support* (Trichet, 2009a). While the ECB has limited its purchases of assets to the European covered bond market, full-allotment auctions have resulted in an expansion of the ECB’s balance sheet and the commercial banks’ excess reserves.

9. Each approach has advantages and drawbacks.
- The commitment to keep interest rates low for an extended period is easy to announce. It is particularly useful when policy uncertainty is high, and would likely encourage long-term investment. However, its effectiveness hinges on credibility, and has value only to the extent that it restricts future options. If inflationary pressures erupt earlier than expected, both reneging on the commitment and sticking to it when raising interest rate appears to be clearly called for could damage the central bank's credibility.
 - Increasing bank reserves via central bank liquidity facilities can be implemented easily as it relies on the ordinary channel of credit creation. It does not expose the central bank to considerable credit risk and reduces the risk of bank runs. Liquidity measures can be self-unwinding and do not pose exit problems. However, they may not translate into larger amounts of credit provided to households and firms if banks are concerned about their capital adequacy, are in the process of reducing the size and the level of risk embedded in their balance sheets, and/or are risk averse due to a weak economic backdrop in which to lend.
 - Purchases of long-term securities, particularly treasuries, are familiar operations with minimal credit risk. They send a clear signal of the central bank's desire to lower long-term rates—and may also be seen as a way to commit to an accommodative stance for an extended period, as such operations will take time to unwind. However, these purchases may not have a significant impact if they account for a small share of a deep government bond market. In fact, if monetization of fiscal deficits is perceived as reducing policymakers' macroeconomic discipline, long-term interest rates may rise reflecting higher inflation expectations and risk premiums.⁵ Moreover, even if treasury yields fall, this may not have much affect on private borrowing rates and credit market risk premiums as heightened risk aversion reduces the substitutability between government and private assets. In addition, buying treasuries at the bottom of the cycle exposes the central bank to potential capital losses once yields start to rise as the economy recovers, unless they are treated as hold-to-maturity assets.
 - Providing credit directly to end borrowers may be more effective than going through banks when banks' capacity and/or willingness to lend are impaired. The activity may also provide a strong signal to market participants—demonstrating through more aggressive and unconventional action that the central bank is ready to go to great

⁵ Although higher inflation expectations are not undesirable following a deflationary shock, moving them up through higher fiscal deficits is hardly an ideal mechanism.

lengths to revive the economy. The central bank can be selective, targeting particularly important and distressed markets. However, credit market interventions present logistical challenges and potentially expose the central bank to greater credit risk than in the past, although some risk-sharing mechanisms have been included in these operations to address this concern. Moreover, such interventions could distort relative prices, potentially hurt commercial bank profitability, and favor some segments of the credit markets while damaging others.

III. MEASURES TAKEN BY G-7 CENTRAL BANKS⁶

10. Since the early days of the financial crisis, advanced country central banks have taken resolute steps to enhance liquidity provision to the financial system (Table 1). Their initial reaction was to dramatically increase the size of liquidity operations. This was followed by steps to broaden the scope of current operations and introduction of new ones to address specific stresses. In particular, to alleviate stress in term markets, central banks extended the maturity of their lending operations. To help overcome market fragmentation and shortage of high-quality collateral triggered by a flight to quality, they expanded the list of eligible collateral for repurchase operations. The ECB—which even before the crisis had a large list of counterparties for its liquidity facilities and the least restrictive collateral rules—was at the forefront of these efforts and made enhanced liquidity provision a linchpin of its approach for dealing with the crisis.

11. As the flow of credit from depository institutions cross-border to foreign banks and to the nonbank financial sector was curtailed, several central banks expanded access to their lender-of-last-resort facilities. In addition, the Fed created a new lending facility to address banks' reluctance to use its discount window, which had a stigma attached to it.⁷ Specifically, the Fed introduced the Term Auction Facility (TAF), which employed an anonymous auction system to lend funds to depository institutions. The Fed eventually cooperated with other major central banks to extend the TAF to foreign banks. It also entered into reciprocal currency swap arrangements with other central banks to increase the availability of dollar funding outside the United States. The ECB also signed similar agreements with the central banks of several European countries to improve the provision of euro liquidity to their banking sectors. Moreover, in order to provide some investment banks with access to lender-of-last-resort funding, the Fed also introduced the primary dealer credit facility (PDCF), which was similar in nature to the TAF but intended for broker-dealers. Finally, to increase the supply of high-quality collateral like U.S. treasuries and U.K. gilts available to financial institutions, the Fed introduced the Term Securities Lending Facility (TSLF) and the BoE the

⁶ Box 2 summarizes historical experience with unconventional monetary policy.

⁷ This stigma relates to the perception that a bank that accesses the discount window facility could be relatively easily identified, and therefore such a bank could face significant pressures from its investors, depositors, and speculators once it draws on the facility.

Special Liquidity Scheme (SLS). The ECB expanded eligible collateral for its operations and offered supplementary longer-term tenders.

12. In the initial phase of the crisis, even as monetary authorities sought to improve money market functioning, their liquidity providing efforts were offset by liquidity draining over the course of their respective maintenance periods, so that no significant net new base money was added to the financial system. This approach had implications for the composition but not the size of central bank balance sheets and had a flavor of a large-scale lender-of-last-resort action.⁸ However, after the collapse of Lehman Brothers, central banks accelerated policy rate reductions and began expanding their balance sheets to support credit more directly.

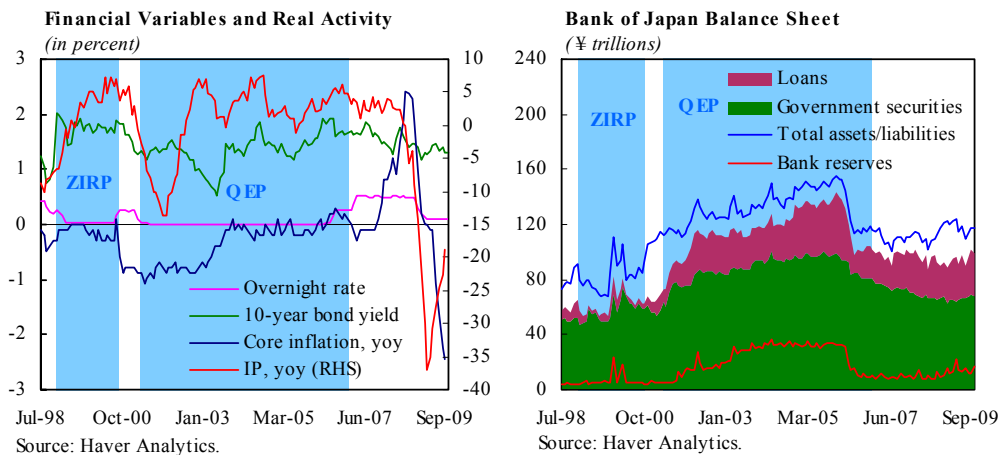
13. One can observe considerable diversity in approaches taken to date among the G-7 central banks (Figure 1). The Fed has advanced far ahead on the path of credit easing, having employed a variety of unconventional measures on a large scale. It has been purchasing government bonds as well as the debt and mortgage-backed securities issued by the U.S. government-sponsored enterprises (GSEs) to bring down their yields and encourage investors to switch to riskier assets. These actions are aimed at reducing long-term funding costs, especially residential mortgage rates, and increasing bank reserves. The Fed has also set up facilities to support the commercial paper market by buying such paper directly from issuers or through money market mutual funds (Box 3). Finally, through the Term Asset-Backed Securities Lending Facility (TALF) the Fed has sought to enhance liquidity and jump-start the private-sector securitization market by providing funding and limiting the downside risk of investors in asset-backed securities. Through its diverse tools, the Fed not only has provided ample resources for banks to lend, but also in some cases bypassed them to give credit directly to lenders and investors, or facilitated credit flows by making funding contingent on lending. In addition, the Fed has stated that the policy rate is likely to stay exceptionally low “for an extended period.”

⁸ Central banks were also involved in more direct rescue operations for several large banks and other financial institutions.

Box 2. Past Experience with Unconventional Monetary Policy

Japan's experience in 1999–2006 provides the prime case study of unconventional measures. Following a bout of deflation, the Bank of Japan (BoJ) introduced in early 1999 the zero interest rate policy (ZIRP), committing to keeping the interbank overnight rate at zero until “deflationary concerns are dispelled.” After a brief recovery of the economy, which pushed year-on-year change in core CPI above zero for just one month, the BoJ lifted ZIRP in August 2000.

However, the collapse of the dot-com bubble and slowdown of the world economy made another recession a possibility. As the overnight rate was still close to zero despite the exit from ZIRP, the BoJ had to take extraordinary measures. On March 19, 2001, it introduced a quantitative easing policy (QEP) and simultaneously committed to keeping the policy rate at zero until “the core CPI registers stably a zero percent or an increase year on year.” The BoJ's quantitative easing set a target on bank reserves at the BoJ at around 5 trillion yen. In addition, the BoJ also announced that it would increase the amount of its outright purchases of long-term Japanese government bonds. The BoJ subsequently increased its target for reserves to 30–35 trillion yen before terminating QEP on March 9, 2006. In addition, the BoJ supported lending through special operations to facilitate corporate financing.



Analysts disagree whether the unconventional policies improved the performance of Japan's economy, as the counterfactual is difficult to establish. Most believe that the failure to deal resolutely with the undercapitalized banking system had doomed the monetary and fiscal efforts to reignite the economy.

Evidence is more positive on the narrower issue of the ability of unconventional monetary policy to affect financial variables. For example, Okina and Shiratsuka (2004) show that the commitment to low rates under ZIRP affected policy rate expectations. Bernanke, Reinhart, and Sack (2004) suggest that QEP was effective in lowering the yield curve. The same authors provide evidence that the Fed's communication strategy in 2003, when its statements sought to reassure the markets that monetary accommodation would be maintained “for a considerable period,” were effective in guiding market expectations of policy rates.

Japan's experience is also relevant for exit. After QEP officially ended, the BoJ was able to reduce the size of its balance sheet and excess reserves fairly quickly, although not all the way to its late-1990s level. It curtailed sharply its funds-supplying operations and started gradually to reduce its holdings of government securities. It also began slowly to divest stocks acquired—on a fairly small scale—from commercial banks, but the process was interrupted by the current crisis. It should be noted, however, that the policy rate was raised only marginally—to 50 basis points—over the year that followed the termination of QEP.

Box 3. Fed's Facilities for Liquidity Provision to Key Credit Markets

The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) provides non-recourse loans to depository institutions and bank holding companies to finance purchases of high-quality asset-backed commercial paper (ABCP) from money market mutual funds (MMMFs). The banks face no credit risk and have zero risk weighting on these purchases. Effectively this facility indirectly guarantees a liquid market for high-rated ABCP holdings of MMMFs, thus encouraging them to remain invested in such paper. It was introduced after a particular MMMF's net asset value fell below par because of its investments in Lehman Brothers, triggering redemptions from other MMMFs. This stressed the commercial paper market as MMMFs had to sell their holdings to meet the increased call for redemptions.

The Commercial Paper Funding Facility (CPFF) provides credit *directly* to issuers of unsecured and asset-backed commercial paper. Through the CPFF, the Fed finances a special-purpose vehicle (SPV) that purchases top-rated 3-month commercial paper directly from issuers. To reduce credit risk for the Fed, the Treasury has made a special deposit in support of CPFF. The facility eliminates rollover risks on terms that are not punitive, but less attractive than those prevailing in the private market before the crisis.

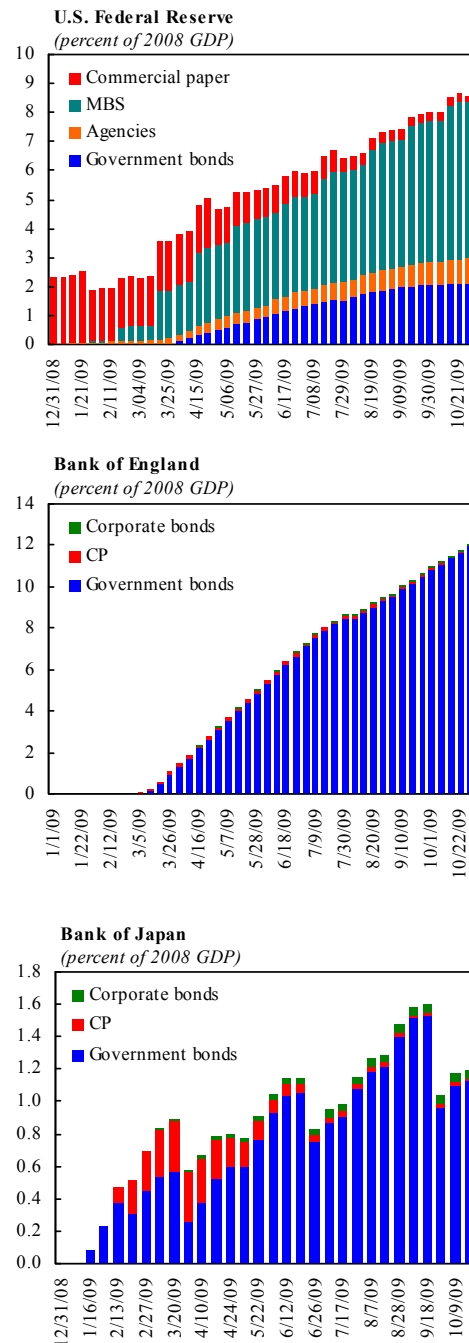
The Money Market Investor Funding Facility (MMIFF) was conceived as an additional support to MMMFs and other money market investors, as it would fund purchases of certificates of deposit (CDs), bank notes, and commercial paper (CP) with maturities up to 90 days issued by highly rated financial institutions. The program had a complicated structure, with the Fed providing senior, secured financing to several SPVs established by the private sector. The SPVs would finance themselves by selling ABCP and by borrowing under the MMIFF. In order to limit the Fed's exposure to credit losses, the SPVs would issue subordinated ABCP (i.e., subordinate to the Fed's claim on the SPV's assets) equal to 10% of the asset's purchase price to the asset seller. The facility had not been tapped, as AMLF, CPFF, and FDIC guarantees provided adequate liquidity to the investors in and issuers of short-term bank liabilities, and expired on October 30, 2009.

The Term Asset-Backed Securities Loan Facility (TALF), operational since March 25, aims to support credit supply to consumers and businesses by facilitating securitization, which was a critical channel of credit supply and bank financing in the pre-crisis period. Through the TALF, the Fed provides 3- and 5-year non-recourse loans to holders of eligible asset-backed securities (ABS) in order to encourage the origination of new ABS and/or to improve trading liquidity in some forms of existing ABS. The program is authorized to lend up to \$200 billion. The eligible ABS include high-quality newly issued ABS collateral backed by student, auto, credit card, small business, and commercial mortgage loans (CMBS). Overcollateralization—wherein TALF borrowers must pledge a larger amount of ABS collateral than the loan amount—ranges from 5 to 16 percent, depending on collateral and maturity. The interest rate on the loan is generally set at 100 basis points above 1-month LIBOR for floating rate loans (backed by floating rate ABS) or above the 3-year LIBOR swap rate for fixed rate loans. The Fed's balance sheet mitigates its risk via overcollateralization and a \$20 billion capital infusion from the Treasury. By accepting CMBS issued before January 1, 2009 (so-called "legacy" CMBS), the TALF works in tandem with the Treasury's Public and Private Investment Program (PPIP) to improve trading conditions for these securities.

14. The Bank of England rivals the Fed in the size of the balance sheet expansion, but its approach has been quite different.⁹ Although it has put in place a program for purchasing private-sector securities to alleviate stress in particular markets, efforts to stimulate the economy are based largely on money creation through government bond purchases (Figure 2). In particular, the BoE was authorized by HM Treasury to purchase up to £150 billion of assets, including a maximum of £50 billion of private-sector assets, financed through the issuance of central bank reserves. On that authority, the BoE announced on March 5 a 3-month Asset Purchase Program (APP) to purchase £75 billion worth of assets, mostly medium and long-term U.K. government notes and bonds (gilts). Subsequently it extended the term and scaled up the target amount twice to currently £175 billion. This amounts to 41 percent of outstanding gilts in the relevant maturity range and nearly 80 percent of planned debt issuance in FY2009. The £50 billion credit easing component of the Bank's unconventional policy authorizes the BoE to purchase a broad range of high-quality private assets, including commercial paper, corporate bonds, paper issued under the Credit Guarantee Scheme (CGS), syndicated loans and asset-backed securities created in viable securitization structures. However, at the moment facilities for only the first two asset classes have been active, with net purchases totaling around £1 billion each of commercial paper and corporate bonds.

15. The Bank of Japan's approach is similar to that of the Bank of England, in that it has undertaken some purchases of private assets, but focuses largely on money creation via purchases of government bonds. However, the scale of operations

Figure 2. Outright Holdings of Securities by Central Banks 1/



Sources: Haver Analytics and Bank of England.

1/ Government and agency bonds - change since end-2008.

⁹ See Meier (2009) for an in-depth analysis of the Bank of England's unconventional policies.

is much smaller. The Bank of Japan has gradually scaled up the size of its outright purchases of government bonds from ¥1.2 trillion per month (the level set in October 2002) to ¥1.4 trillion in December 2008, and then to ¥1.8 trillion per month starting in March. At the latest rate, annual purchases would amount only to 2½ percent of the federal debt outstanding in early 2009—but close to 50 percent of the net bond issuance projected for 2009, providing an important source of financing for the government. On the other hand, even at that pace, BoJ’s bond purchases are not much larger than amortization.

16. In addition to increasing bank reserves through government bond purchases in a manner reminiscent of its policy in the early 2000s of quantitative easing, the BoJ has been purchasing private sector securities to alleviate stress in particular market segments. In particular, it has purchased high-grade commercial paper and corporate bonds with remaining maturity of less than a year. However, these operations are rather small, with BoJ commercial paper holdings barely exceeding one percent of its balance sheet (compared to nearly 18 percent at its peak for the Fed), and the limit on these holdings—¥3 trillion—is under 3 percent of the BoJ balance sheet size, and 16 percent of Japan’s commercial paper market. BoJ’s corporate bond holdings are currently negligible, and the limit is set at ¥1 trillion. In addition, in October 2008 the Bank suspended divestment of stocks it acquired to support the economy in the early 2000s. Then in February 2009 it started purchasing stocks from Japanese financial institutions to help reduce their exposure to market risk. This program is also limited to ¥1 trillion.

17. The European Central Bank has followed a strategy of “enhanced credit support.” It has boosted its liquidity facilities and expanded its balance sheet considerably, but has not engaged in outright purchases of government paper. Until recently, the ECB had not supported credit markets directly, but it greatly facilitated issuance of private securities and provision of certain types of loans by accepting them as collateral in its refinancing operations. It has gone the furthest among major central banks in expanding the range of acceptable collateral and the term of its liquidity providing operations.¹⁰ It auctioned off an unprecedented €442 billion of one-year funds at one percent in late June and another €75 billion in late September. Finally, to support the housing market, the ECB has initiated a €60 billion program to buy covered bonds over the course of 12 months, with purchases starting in July 2009.

18. The Bank of Canada is the only major central bank besides the Fed to have committed to maintaining low policy rates until there are clear signs of recovery. Moreover, in its latest statements it has made a “conditional commitment” to keep the interest rate at its effective low bound of 25 basis points until the end of the second quarter of 2010, pioneering the communication of a specific end date for this type of guidance. While expanding its

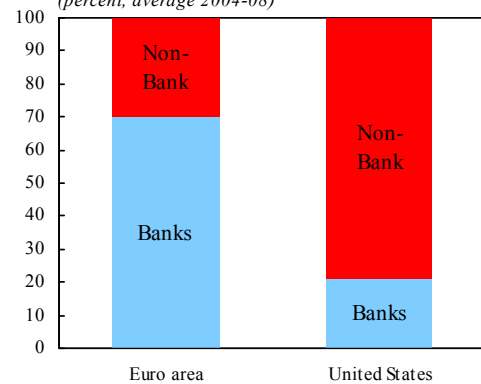
¹⁰ Even before the crisis the ECB accepted a broader range of collateral—including even commercial bank loans—than other major central banks.

liquidity operations, the Bank of Canada has taken very limited steps in the other areas, but it has preemptively put together a framework for quantitative and credit easing and has indicated that it is prepared to use such instruments if needed to achieve its inflation objective.

19. What can account for the considerable difference in the extent to which G-7 central banks have relied on different unconventional approaches? Faced with an arguably unprecedented set of issues—a global financial crisis, near-simultaneous burst of several asset-price bubbles, breakdown of securitization, collapse of confidence, synchronized recession—central banks had to explore measures based on individual country circumstances and without much support from economic theory or prior experience, and understandably came up with somewhat different solutions. There also appears to be a conceptual disagreement on the usefulness of providing explicit guidance regarding the future path of interest rates. Largely, however, the differences in responses can be attributed to the differences—real or perceived—in the countries’ circumstances. Such circumstances include the depth and timing of recessions or slowdowns in individual countries, the relative roles played by banks and capital markets in credit allocation, the severity of the problems in the financial system, the flexibility of preexisting institutional arrangements, political environments and structures, and actions taken by the nonmonetary authorities.

20. In particular, in the early stages of the crisis the ECB appeared to be relatively more optimistic about the outlook. Consequently, it had focused on liquidity support for struggling banks much more than on stimulating demand through rate cuts or quantitative easing. More importantly, the nonfinancial private sector in Europe relies much more on the banking system for credit than on securities markets (Figure 3), and the authorities’ efforts have appropriately focused on ensuring the banks are strong and have adequate resources to lend. Even in the United Kingdom, outstanding corporate bonds of domestic nonfinancial issuers total about £15 billion, with another £7 billion in commercial paper, so even the fairly small allocation for private assets under the APP amount to a non-negligible share of these markets.¹¹ Moreover, with a broad access to its lending window to begin with, there was less need for the ECB to introduce new facilities. At the same time, if the transmission mechanism through banks is impaired, credit

Figure 3. Sources of Financing for Corporations 1/
(percent, average 2004-08)



Source: ECB Monthly Bulletin, April 2009.

1/ Breakdown of the sources of external financing of non-financial corporations.

¹¹ However, the market is much larger if financial issuers and foreign corporations issuing sterling debt are included.

easing is worth contemplating even in countries with traditionally large reliance on the banking system, as a way to go around the temporarily blocked traditional channel.

21. Canada has emerged as one of the few countries whose financial system has not been damaged severely by the financial crisis, and the Bank of Canada until recently could afford to rely largely on conventional measures to support the economy in the face of external shocks. However, with economic prospects dimming and a global rise in risk aversion, Canadian banks have been tightening credit conditions, while the Bank of Canada has exhausted room for interest rate cuts. Consequently, the BoC is guiding interest rate expectations and has a framework for quantitative and credit easing in the event the outlook deteriorates. In a similar vein, although Japan's financial institutions were not highly exposed to U.S. toxic assets, their losses on stock holdings and expected rise in delinquencies have made them reluctant to lend, prompting the Bank of Japan to initiate some limited credit easing measures.

22. Finally, the actions of the legislative and executive branches of government shape the environment in which central banks and financial systems operate. G-7 governments have taken numerous actions to support financial institutions (Table 2). Guarantees of bank debt and deposits decreased bank reliance on wholesale funding such as through commercial paper and repurchase agreements. In certain countries the government has taken a leading role in providing support to credit markets, reducing the need for central bank operations. For example, in Canada the government has been purchasing insured mortgage pools from financial institutions, as well as term asset-backed securities. In the U.K., the government is leading the effort to restart residential mortgage securitization through its guarantee program, and the Development Bank of Japan has started outright purchases of commercial paper.

23. It should be noted that while all central banks pledge prudence in their credit easing operations, there is considerable differentiation in their exposure to credit risk. The Fed has accumulated the largest portfolio of risky private-sector securities among the major central banks, with the understanding, initially implicit, but now partly formalized in the setup of the CPMF and TALF and in a joint Fed–Treasury statement, that ultimately the Fed's losses, if any, will be borne by the government.¹² In the U.K., the government authorized asset purchases by the Bank of England in a formal exchange of letters between the Governor and the Chancellor. The Bank is explicitly indemnified by the Treasury from any losses arising from these purchases. The supranational nature of the European Central Bank may have contributed to its reluctance to buy assets.

¹² The Fed is protected against losses by its focus on purchasing highly rated securities, overcollateralization, and the government's support for the GSEs.

IV. EFFECTIVENESS OF UNCONVENTIONAL POLICIES

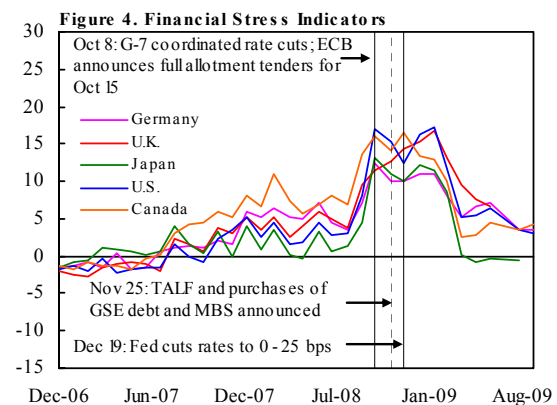
24. Taken collectively, policy actions, notably by major advanced country central banks, have contributed to the reduction in systemic tail risks following the bankruptcy of Lehman Brothers and to the recent improvements in market confidence and risk appetite, as well as to the bottoming out in G-7 economies. However, financial indicators suggest that some policies are proving to be more successful than others and that central banks may need to take further actions if market conditions regress. Moreover, market developments highlight the limits to which central bank interventions can arrest the forces of global deleveraging and weakening aggregate demand, and signal that continued and potentially further public interventions may be needed to address on-going credit constraints. As highlighted in the IMF's April 2009 Global Financial Stability Report (GFSR), "without a thorough cleansing of banks' balance sheets of impaired assets, accompanied by restructuring and, where needed, recapitalization, risks remain that banks' problems are likely to keep the credit capacity of the financial system too low to support the economic recovery" (p. XV).

25. Gauging the effectiveness of central bank measures is difficult because transmission to the economy is complex and opaque. A number of factors influence market conditions, and the impact of individual policies is difficult to isolate, especially from the impact of fiscal and non-central-bank financial policy actions taken over the crisis period. Moreover, it is difficult to determine what would have happened if the central banks had not taken action, especially given the relatively low level of market confidence that has prevailed since the crisis started.

26. This analysis focuses on the observable effects of central bank interventions on credit conditions, especially on credit market interest rates, spreads, and volumes. It reviews the various transmission channels of policy: broad credit, bank lending, and interest rates, as well as the impact of policies on specifically targeted markets.

Central banks have helped to reduce tail risks, but financial conditions remain tight and the bank lending channel strained

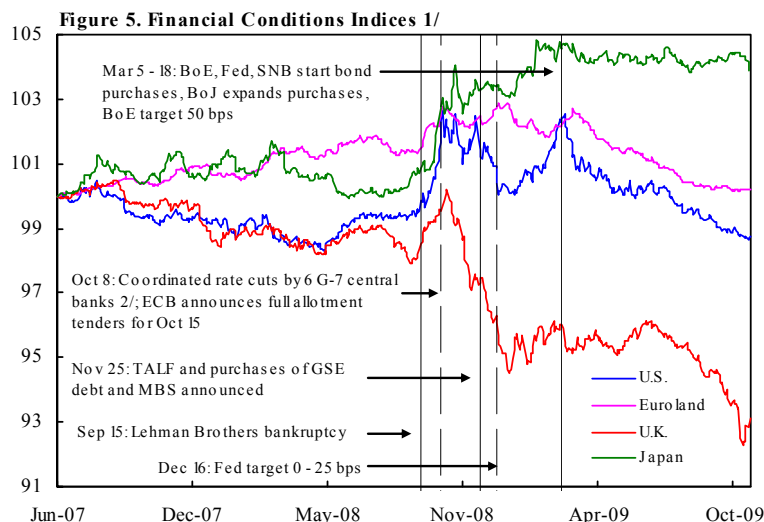
27. Forceful monetary easing and virtually unlimited offers of liquidity by major central banks have helped to reduce the extreme financial stress and tightness in financial conditions that prevailed following the bankruptcy of Lehman Brothers. Moreover, a few authorities, like the Federal Reserve and Swiss National Bank, directly participated in the rescue efforts for specific large, highly



interconnected financial institutions.¹³ As a result, the IMF's financial stress indices (FSIs, Figure 4)¹⁴ for the major advanced economies have all dropped, with some falling below their pre-Lehman bankruptcy levels. Central bank efforts have helped to reduce the systemic tail risks, including the potential for cascading insolvencies in the financial sector. Broad measures of financial conditions (Figure 5) have also improved, partly due to the significant drop in

real short-term rates. However, conditions remain tight relative to their pre-crisis levels, especially for some regions where higher real effective exchange rates and lower equity market capitalization (in Europe and Japan) have offset the decline in interest rates.

28. Despite the tremendous infusion of liquidity by central banks and the capital and guarantees provided by other agencies, the bank lending channel remains strained. Central banks have a more limited role in meeting the potential capital needs of banks and strengthening their capacity for new lending. Although many mature market banks have increased their capital adequacy via public and private capital raising, these efforts appear to have primarily stabilized the banking system, but not enough capital has been raised to adequately support lending and the economic recovery.¹⁵ Bank lending to the private non-financial sector has decelerated rapidly in the Euro area and the United States, and turned negative in the United Kingdom (Figure 6). The decline in total lending also looks dramatic (Figure 7). Still, were it not for official interventions, credit flows would likely have fallen much more—beyond comparison with any other postwar recession—given the magnitude of the shock. Surveys from the ECB and the Fed indicate that banks are still tightening lending



Sources: Goldman Sachs and IMF Staff.

1/ The indices combine real 3-month and long-term interest rates, the real exchange rate, and equity market capitalization to GDP.

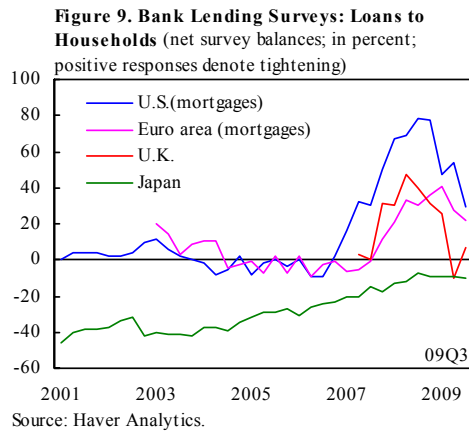
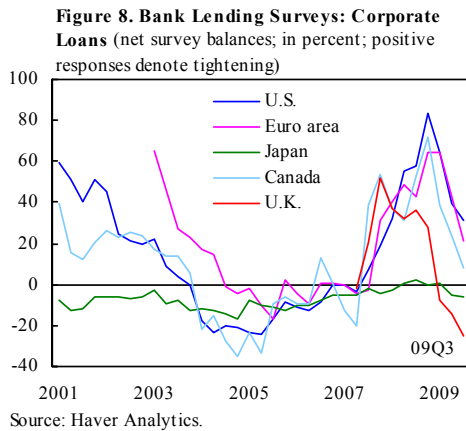
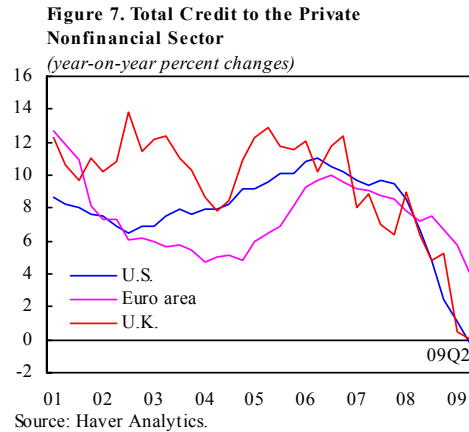
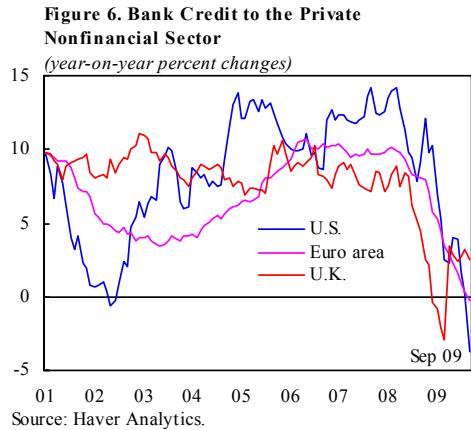
2/ Bank of Canada, Bank of England, ECB, Federal Reserve, Riksbank, SNB cut rates by 50 bps with strong support by Bank of Japan. The ECB recinded the rate cut and instead announced full allotment tenders at main refinancing rate.

¹³ The Bank of Japan also stands ready to purchase equity holdings and subordinated debt of major Japanese banks.

¹⁴ The FSIs consist of seven financial market variables, including the beta of banking stocks, the TED spread, the slope of the yield curve, corporate bond spreads, stock market returns, stock market volatility, and exchange rate volatility (Balakrishnan and others, 2009).

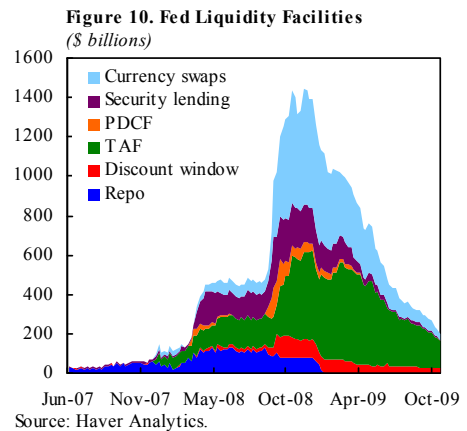
¹⁵ The October 2009 GFSR explains (p. 27) how the lending capacity of banks in the euro area, the United Kingdom, and the United States is projected to decline in both 2009 and 2010, contributing to a potential ex-ante gap between total nonfinancial borrowing needs and the total capacity of the system to provide credit.

standards to households and nonfinancial firms, albeit not as vigorously as at the peak of the crisis (Figures 8 and 9). In the United Kingdom, standards for corporate lending actually loosened slightly in the first half of 2009, but remain tight nonetheless. In contrast to these swings, lending standards in Japan have largely remained on the pre-crisis trajectory of moderating loosening, with standards for large corporations reaching the neutral point.



Funding strains are easing, but the money market complex is contracting

29. Central banks have eventually been successful in reducing term premiums in money market rates and increasing the availability of short-term financing. The record low levels of target policy rates and generous liquidity providing operations have contributed to the steep reductions in LIBOR, repurchase, and commercial paper (CP) rates and their risk premiums, as well as a narrowing in foreign exchange swap basis. Reflecting this reduction in liquidity risk, use of central bank liquidity facilities has generally been falling lately (Figures 3 and 10).



- LIBOR rates on maturities of 3 months or more have dropped across a number of currencies, and so have their spreads over implied overnight rates derived from overnight index swaps (OIS) (Figure 11). In fact, the 3-month LIBOR-OIS spread for the U.S. dollar has fallen back to near pre-crisis levels more recently. This not only means lower bank funding costs, but a decline in key indices used in setting the interest rates on a host of loans to nonfinancial actors, and fixed income and derivative products. However, LIBOR-OIS spreads still remain wider than their pre-crisis levels for some currencies like the euro and sterling, partly reflecting the limits of central bank liquidity operations. The operations appear to have reduced liquidity risk premiums but have had less of an impact on counterparty credit risk premiums as reflected in a greater decline in LIBOR-OIS spreads than in bank CDS spreads (Figures 12 and 13).¹⁶ Credit risk premiums remain high as markets still perceive banks to face considerable risks from unresolved troubled asset issues and headwinds from rising unemployment. Moreover, higher premiums may also reflect a longer-lasting increase in the price of credit risk embedded in uncollateralized money market rates.

Figure 11. Three-month LIBOR-OIS spreads (basis points)

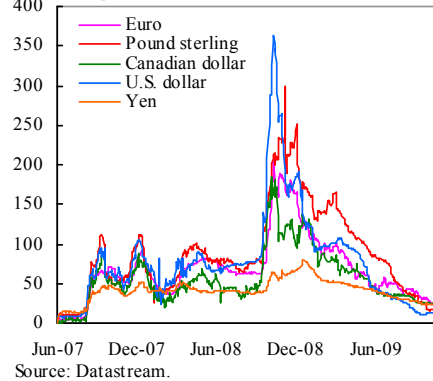
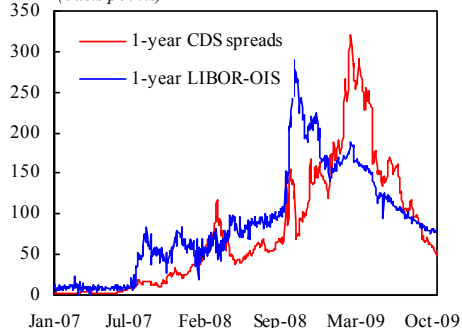
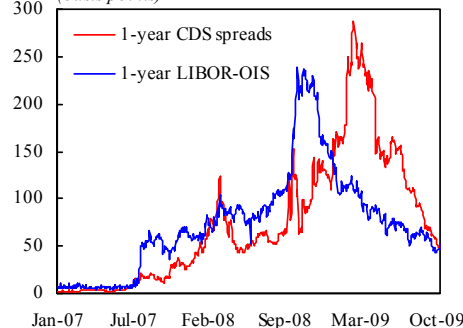


Figure 12. U.S. Credit and Liquidity Strains 1/ (basis points)



1/ Spreads are for participating banks that fix USD LIBOR rates.

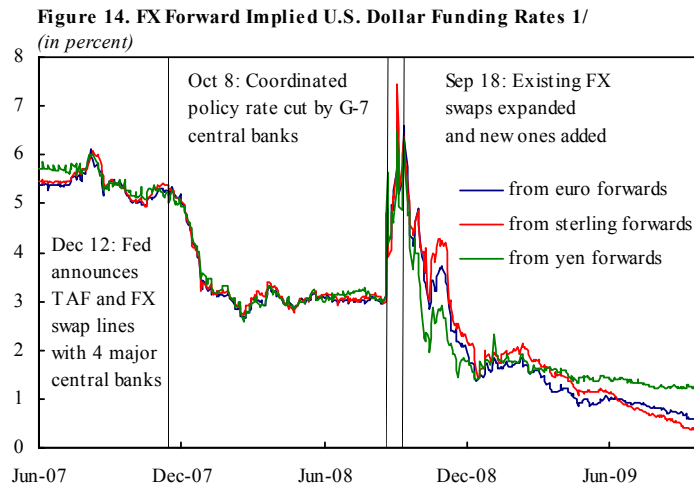
Figure 13. EU Credit and Liquidity Strains 1/ (basis points)



1/ Spreads are for participating banks that fix Euro LIBOR rates.

¹⁶ The LIBOR-OIS spreads can be decomposed to estimate what can be attributed to counterparty credit risk and other risks, including liquidity risk.

- The Term Auction Facility¹⁷ and currency swap arrangements between the Fed and 14 central banks have helped to enhance the functioning of the foreign exchange swap and forward markets. These markets had become dislocated as financial institutions, especially those without access to Fed liquidity, attempted to garner their short-term dollar funding from other sources. At the height of the crisis, dollar funding rates implied by 3-month euro and sterling forward contracts were 6.6 percent and 7.4 percent, respectively. By mid-summer 2009, these rates had fallen to around 1 percent (Figure 14).



Sources: IMF staff calculations and Bloomberg L.P.

1/ 3-month U.S. dollar funding implied by FX forward and libor rates.

- Commercial paper rates are falling in advanced economies, driven in part by direct purchases and liquidity operations by the Fed, BoE, and BoJ targeted at short-term corporate financing. Both the highest and the lower tiers of CP rates are falling,¹⁸ although there is still a wide positive spread between the higher and the lower tiers (Figure 15). In the United States, the amount of CP outstanding has been contracting, notwithstanding temporary increases following the announcements of the AMLF and the CPFF (Figure 16). This largely reflects a fall in demand for CP funding since banks have alternative funding sources via government guaranteed debt, to a lesser extent non-guaranteed note issuance, and increased deposits. At the same time, it should be noted

¹⁷ A few studies have empirically tested the effectiveness of the TAF in reducing the dollar LIBOR-OIS spread. An early study by Taylor and Williams (2009) concluded that it was not effective, but other studies by Sack and Meyer (2008) and McAndrews, Sarkar, and Wang (2008) refute that conclusion. A fourth study by Hooper and Slok (2009) concluded that the announcement effect of the TAF was the most important, whereas the TSLF was not significant in narrowing the LIBOR-OIS spread.

¹⁸ In the United States, second tier CP volumes have fallen substantially, so the decline in rates may partly reflect a survivorship bias, although the drop in broad liquidity concerns is likely a more important factor.

that the Fed's facilities buttressed the CP market at the crucial time, allowing a reduction in rate and extension of maturities and supporting the volume.

Figure 15. U.S. Commercial Paper Spreads over T-bill
(in percent)

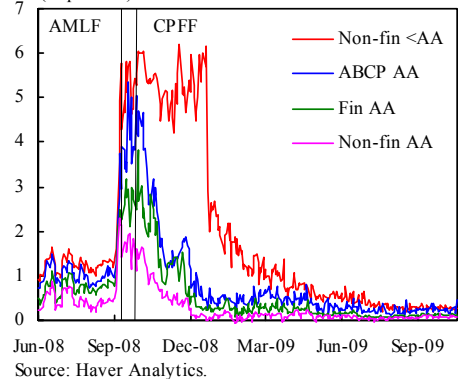
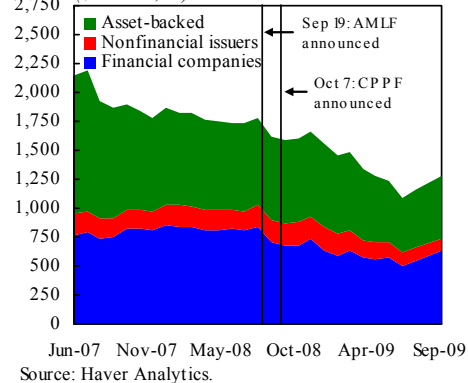


Figure 16. U.S. Commercial Paper Outstanding
(\$ billions, sa)



- Term repurchase (repo) rates have declined in G-7 countries due in part to central bank operations to aid the functioning of the repo markets, such as the BoE's Special Liquidity Scheme and the Fed's Term Securities Lending Facility. These and other central banks, particularly the ECB, freed up some of the high-quality collateral that financial institutions could use as collateral by accepting a wider range of assets to pledge at central bank auctions. There had been a scarcity of high-quality collateral as demand for safe haven assets rose and counterparties no longer accepted nontraditional collateral for repos during most of the crisis. Despite lower repo rates, volumes have fallen over the crisis as the number of dealers has declined, and the activity of securities lenders and some other money market investors has been curtailed.

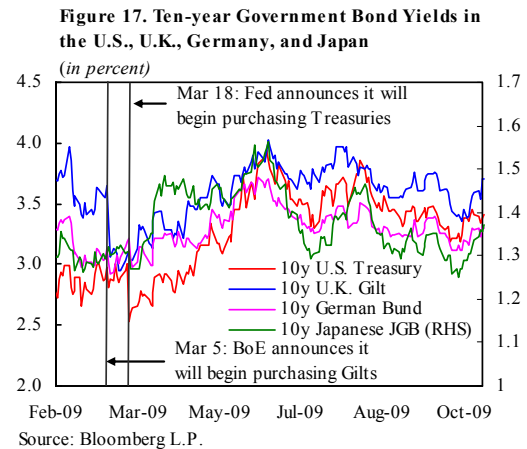
30. Despite the reduction in money market rates and risk premiums, the progress on money market volumes is mixed, with some segments still experiencing significant drops in outstanding amounts. The shock to the money market complex during the crisis has led to a potentially long lasting repricing of credit risk in money market rates, the exit and significant reduction in the activity of a number of money market players, and a likely tightening of regulations governing bank liquidity management and money market mutual fund investments. In addition, ongoing deleveraging efforts by financial firms are likely to lead to a reduced demand for funding, and the very low levels of money market rates are leading to early signs of reduced demand for money market investments. All of these factors have led to broad-based shrinkage in money market activity and capacity, some of which is likely to persist for a long period of time.

Central banks' efforts to reduce longer-term rates have had more mixed results

31. Central bank operations directed at longer-term fixed income markets, including those supporting securitization markets, have had mixed results, with some programs more successful at lowering rates or significantly affecting origination than others. Yields on government bonds have increased over the last several months despite sizeable purchases by

a few major central banks. The spreads between private asset yields and treasuries have declined both in the markets with major central bank support, such as the U.S. conforming mortgage market, and in those with much more limited support, such as corporate bonds. This suggests that the compression in a wide variety of credit spreads since the first quarter of 2009 may be partially attributed to the broad-based fall in investor risk aversion, rather than to any particular policy interventions—although it may well be the totality of the interventions that has created a more favorable climate.

- Improving views about the global economic outlook, reduced concerns about deflation, and some anxiety about increased government supply to finance anti-crisis efforts are counteracting the yield impact of quantitative easing by the Fed, BoE, and BoJ. As a result, despite a noticeable drop in intermediate-dated yields on U.S. and U.K. government bonds immediately following the announcement of large bond purchase programs by the respective central banks (Figure 17), most global yields are much higher than their post-announcement levels.

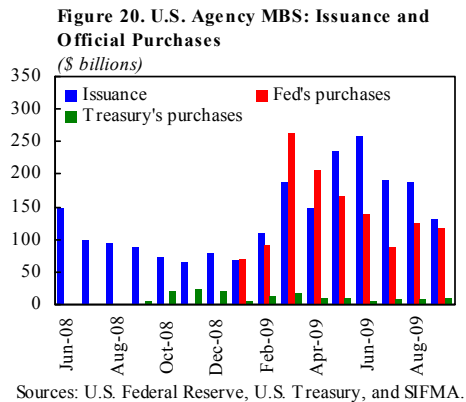
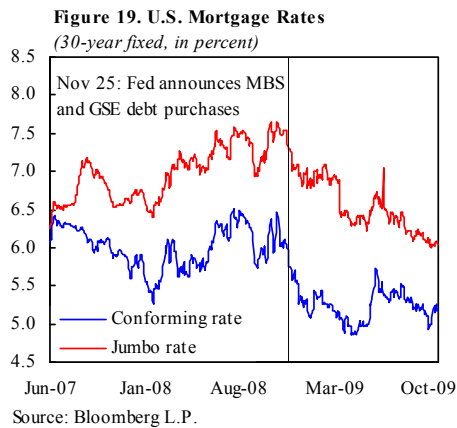
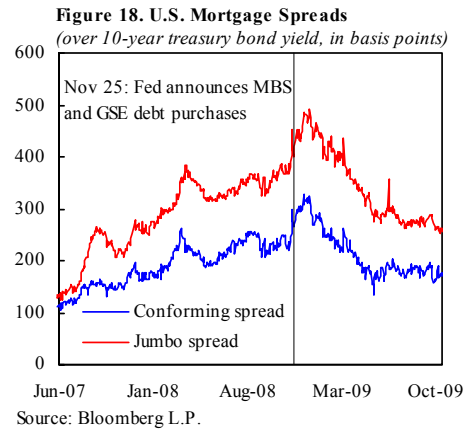


In particular, between the announcement date on March 18 and October 30, 2009, 5- and 10-year U.S. Treasury yields rose about 35 bps. In contrast, Japanese government bond (JGB) and U.K. gilt yields moved by much less since the BoJ and BoE first made announcements regarding outright purchases of governments bonds during the crisis,¹⁹ although 5-year gilts increased 26 bps since March 4, 2009 due in part to the BoE's announcement that it would suspend its purchases of 5- and 12-year bonds as of late June. In Germany and Canada, whose central banks have not engaged in purchases of government bonds, 10-year yields rose about 9 and 44 bps, respectively, between the ECB's and BoC's March monetary policy meetings and the end of October 2009.

- Interestingly, augmented liquidity provision may have an impact on government bond yields. Čihák, Harjes, and Stavrev (2009) estimate a yield curve model for the euro area and find that in the recent period the actual spread between longer-term and short-term interest rates has been lower than predicted—even though the ECB is not buying government bonds. They attribute that deviation to the enhanced credit support provided by the ECB, although other explanations cannot be ruled out.
- The Fed's purchases of the mortgage-backed securities (MBS) and direct obligation of the U.S. government-sponsored enterprises (GSEs) helped to reduce mortgage rates and

¹⁹ The BoJ announced the first increase to its JGB purchases on December 19, 2008, and the BoE announced its asset purchase facility on March 5, 2009.

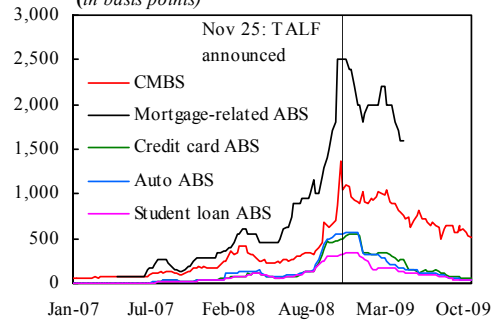
compress their spreads over U.S. Treasuries between November 25, 2008 and late April 2009 (Figure 18). However, since then these yields have risen and remain above their late April levels. On net, both 30-year agency conforming mortgage rates and those on non-conforming jumbo loans remain below the levels observed before the Fed announced its purchase program, and those on jumbo yields have declined more (Figure 19). Additionally, there was a large jump in refinancing as conforming mortgage rates fell below 5.0 percent, but this activity has slowed. Moreover, since November 2008 there has been very little private buying interest in agency MBS, leaving the Fed to purchase a significant share of new issuance (Figure 20).



- The corporate bond purchases by the BoE and BoJ have been small relative to the size of their balance sheets and the size of the overall markets. The BoE uses its program primarily as a backstop to potential dislocations in the U.K. corporate bond market. Despite the small amounts purchased, the BoE's program has contributed to the narrowing of U.K. corporate bond spreads on the margin. The main reason for tightening corporate credit spreads is the broader investor interest in corporate bonds globally. Given these improvements in bond market conditions, the BoE's purchases have begun to slow, and market participants suggest that the corporate bond portion of the asset purchase program may no longer be necessary, although greater support for other private credit markets may still be warranted. The BoJ focuses its purchases on bonds with up to one year in maturity. They are part of the BoJ's efforts to enhance corporate funding conditions, and are not geared toward lowering longer-term corporate bond yields or credit premiums.

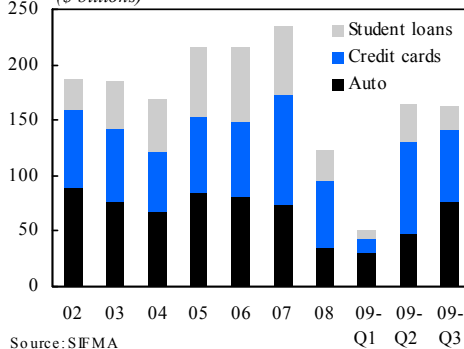
- Resuscitating securitization markets through the Fed’s TALF is proving to be challenging. Secondary market spreads on highly rated consumer asset-backed securities (ABS) and commercial MBS (CMBS), and to a lesser extent mortgage-related ABS, have narrowed considerably since the announcement of the TALF and the eligibility of CMBS for TALF funding (Figure 21). However, the capacity of traditional buyers of consumer ABS and CMBS has diminished over the crisis, and the Fed is enticing remaining players into this space with very high expected returns on their capital. The Fed’s efforts have helped new issuance of consumer ABS to normalize (Figure 22). New CMBS issuance, however, remains virtually nonexistent (Figure 23). TALF funding for CMBS has been used primarily for the purchase of legacy CMBS, rather than newly originated securities. There is no Fed support for new issuance of private label residential MBS, and the U.S. Treasury’s Private-Public Investment Program is geared towards supporting legacy securities held by banks.

Figure 21. AAA-rated U.S. Asset-backed Securities 1/
(in basis points)



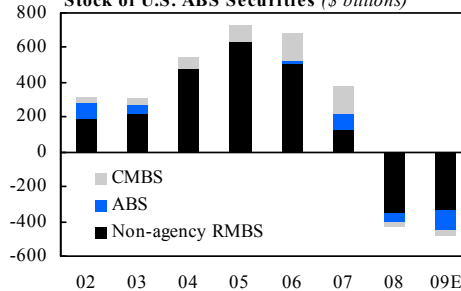
Source: J.P. Morgan
 1/ Spread to LIBOR for credit card, auto, and student loan ABS.
 Spread to interest swap rates for CMBS and mortgage-related MBS.
 Data was unavailable for mortgage-related MBS after May 2009.
 CMBS = commercial mortgage-backed securities.

Figure 22. Gross Issuance of U.S. Consumer ABS 1/
(\$ billions)



Source: SIFMA
 1/ 2009 quarterly numbers are given at an annual rate.

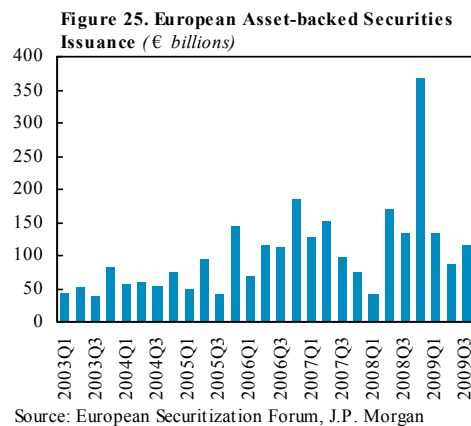
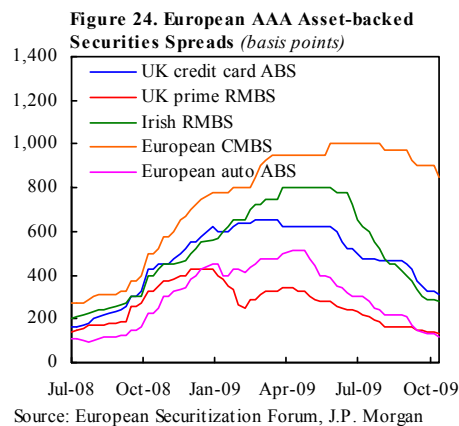
Figure 23. Annual Change in Outstanding Stock of U.S. ABS Securities (\$ billions)



Sources: Thomson Financial, Bloomberg, SIFMA, Loan Performance, Trepp, and J.P. Morgan.
 Note: ABS include autos, student loans, and credit cards. CMBS reflect conduit issuance. RMBS include subprime, Alt-A, and prime.

- Securitization markets also remain under pressure in Europe, despite the wider collateral accepted and longer terms offered by the ECB’s and BoE’s liquidity operations. The U.K.’s official program to guarantee new issuance of securitized products is run by H.M. Treasury. Secondary market spreads in U.K. and European ABS and residential MBS markets remained on an upward trend until the first half of 2009 amid concerns about credit deterioration in their underlying collateral. Spreads only started to improve significantly after the ECB extended the term of its fixed rate, full allotment liquidity operations to one year (Figure 24), and the origination of privately distributed ABS has been limited. Total primary issuance volumes did not materially decline in 2008 and 2009, reflecting the significant amount of new issues retained by the issuer as collateral for central bank funding (Figure 25). For all of 2008, market participants estimate that

98 percent of new issues were retained by issuers. However, more recently a few banks have begun to issue privately distributed ABS.



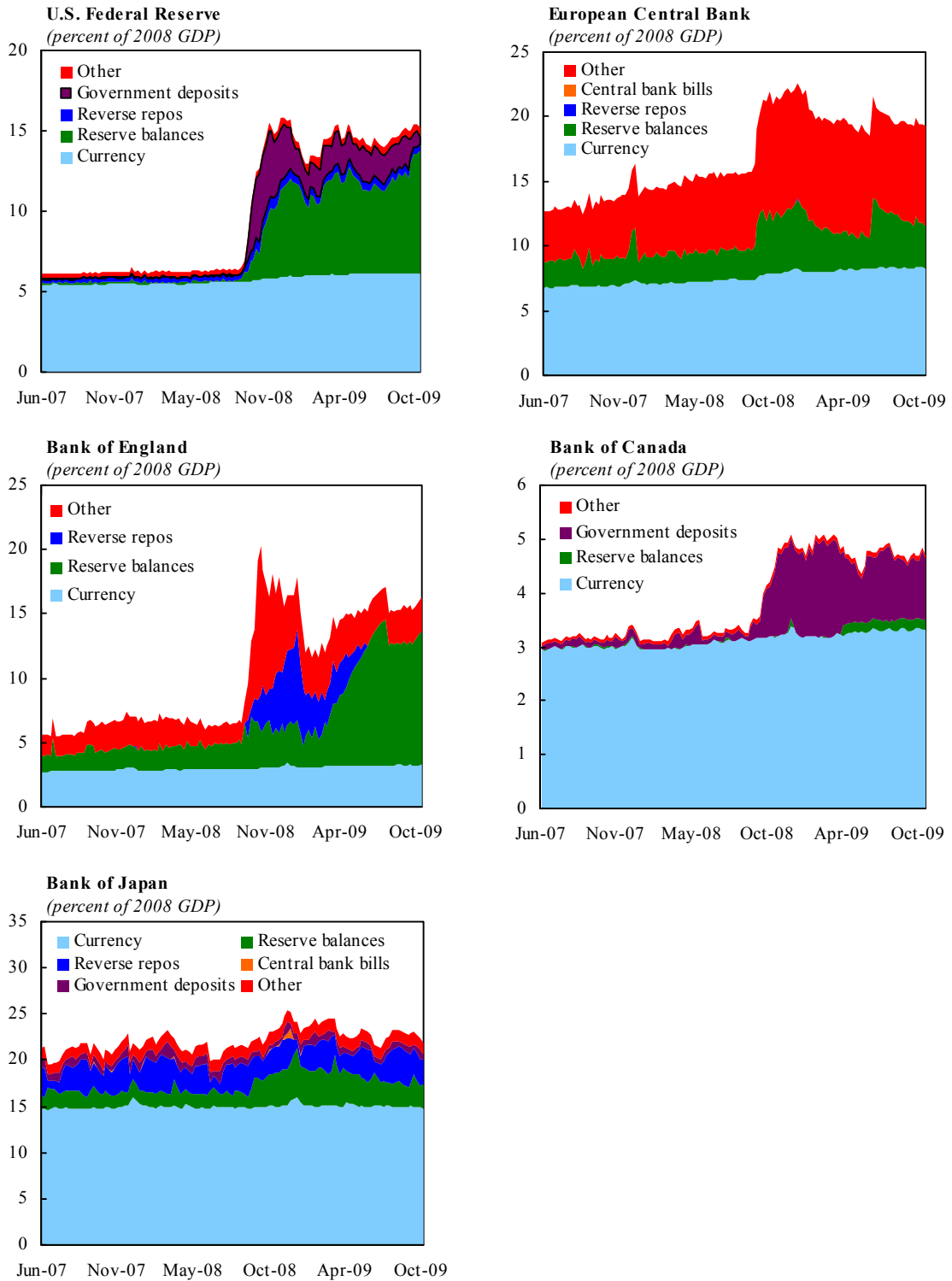
- The ECB's program to purchase €60 billion of European covered bonds has led to improvements in that market. Credit spreads have narrowed since the ECB's announcement in early May and issuance volumes have risen. The ECB has purchased €17 billion—28 percent of the intended amount—in covered bonds in both the primary and secondary markets as of early October.

V. EXIT STRATEGY

32. At the current juncture in the global economic cycle, monetary policy in the large advanced economies is justifiably accommodative, notably since there are no clear signs as yet of a durable recovery and core inflation continues to soften. However, when financial conditions normalize and activity gains greater momentum, monetary stimulus will need to be withdrawn consistent with maintaining the economy at potential and avoiding inflation. Although complex technical and conceptual issues are involved, as emphasized in Cottarelli and Viñals (2009), central banks have adequate tools to control monetary conditions during the exit.

33. Developing clear and effective exit strategies from exceptional monetary policy actions, involving both an unwinding of unconventional measures and a return to overnight interest-rate management as the principal tool of monetary policy, will be central to ensuring a smooth return to normal market functioning. The large expansion of central bank balance sheets is mirrored in the growth of bank reserves, underpinning concerns that the excess liquidity could transform into rapid credit growth and lead to inflation (Figure 26). Such concerns are not justified at this stage of the economic cycle, notably because of large and rising output gaps coupled with a shortage of bank capital and a tightening of bank lending standards. However, it is imperative that central banks develop plans that achieve timely and smooth exits from exceptional policy actions to ensure a smooth return to private credit intermediation and to forestall inflation.

Figure 26. Evolution of Central Bank Liabilities



Sources: Haver Analytics and staff estimates.

But care is required to avoid a premature withdrawal of support that could set back the healing process and the incipient recovery. Moreover, to limit concerns about inflation and the risk that liquidity is prematurely withdrawn while the recovery is still fragile, monetary authorities will need to communicate clearly their exit strategies to the markets.

34. In considering the exit from exceptional monetary policy actions, several conceptual issues come to the fore. First, does the size of central bank balance sheets prior to the crisis provide a guide for their appropriate size as exit is achieved, and, if so, how fast can balance sheets contract without undermining the balance between sustaining economic recovery and limiting inflation pressures? Second, can central banks control policy rates even though their balance sheets remain significantly larger than they were prior to the crisis? Third, are there certain central bank actions undertaken during the crisis that will unwind automatically as financial conditions improve? Fourth, beyond self-unwinding operations, can monetary policy be tightened through substitution on the liability side rather than a contraction of their bank balance sheets? Fifth, if central bank balance sheets need to contract, how best to prioritize asset sales without undermining economic recovery? Sixth, how to guard central banks against losses?

35. There may be merit in central banks holding some assets to maturity, even if it implies expanded balance sheets for an extended period of time. Exceptional policy actions by central banks in the context of the crisis have led to a rapid acquisition of assets, mirrored by an expansion of reserves on the liability side of their balance sheets. While the recourse to unconventional measures has exposed central banks to greater credit risk, to the extent that these policy measures were aimed at alleviating strains in individual credit markets, central banks may choose to sustain their operations, even though they are acting more broadly to tighten monetary conditions. Moreover, while some unconventional measures will unwind naturally as market conditions normalize, others that are centered on purchases of assets that are longer term in nature and less liquid could be difficult to wind. If these assets are sold before the relevant markets recover, central banks may incur significant financial losses. The problem is likely to be much greater for some assets, such as mortgage-backed securities and agency bonds, where central banks, notably the Fed, have come to dominate the market, than other assets, notably treasuries, where the market is deep and central bank purchases are comparatively small, except in the United Kingdom. The composition of central bank assets will in part determine the approach to be taken.

36. As and when the balance of risk shifts toward greater concerns regarding inflation, central banks can shift towards a tightening of the monetary policy stance through liability management, notwithstanding expanded bank balance sheets and large reserves in the banking system. A byproduct of aggressive credit and quantitative easing by central banks is the rapid buildup of aggregate reserves in the banking system, leading to a sharp decline in overnight rates that is consistent with broad macroeconomic objectives in the current context. If, however, inflation concerns mount, central banks could begin to raise policy rate even if their balance sheets are substantially above pre-crisis levels. Above-zero policy rates may

well coexist with expanded balance sheets on the way up, as they did on the way down (Figure 1).

37. However, managing the excess reserves to allow central banks to control policy rates will be critical to formalizing exit strategies from the unconventional measures. Although there may be room to unwind the stock of treasuries on central bank balance sheets—given the depth of the treasuries market and the relatively small size of central bank purchases—to mop up excess reserves prior to raising policy rates, unwinding of unconventional measures aimed at easing specific credit markets will need to be timed with the repair of these markets. Beyond the sale of treasuries to soak up liquidity, central banks could raise interest paid on reserves to discourage banks from lending their excess reserves to each other in the overnight market and push the overnight rate below the target. The Fed’s recently acquired ability to pay interest rate on bank reserves or instruments such as the ECB’s deposit facility ensure central banks’ ability to keep the interbank overnight lending rate in a tight range.²⁰

38. With regard to the unwinding of unconventional measures, short-term credit operations—where the scale of intervention is determined by private demand—have already started to unwind naturally as market conditions normalize. Financial conditions have improved, making central bank programs increasingly unattractive, notably since lending facilities provide liquidity at a premium over the main policy rate or with a high haircut applied to the required collateral. This has made interbank lending the more attractive option, and banks have reduced their recourse to liquidity provision from the central banks, although the outstanding levels under various old and new facilities are still considerably higher than before the crisis. Central bank currency swaps have shrunk as dollar funding in non-U.S. markets has improved. Similarly, recourse to the discount window has declined, while some of the Fed’s emergency facilities, including the PDCF and the TSLF, have not been accessed in recent months and the amount outstanding under the TAF has declined.²¹ One exception is the euro area, where in late June banks took the opportunity to lock in one-year credit offered by the ECB at the rate of one percent. However, this spike has proved to be temporary, as banks are not rolling over fully the maturing loans under shorter-term facilities.

39. The unwinding of medium- and long-term asset purchases may, however, be a slower process. Selling these securities once conditions normalize seems to be a logical counterpart to buying them when conditions were stressed. On the other hand, given the large size of many credit-easing programs involving the purchases of long-term assets, including corporate bonds and agency securities, it will be difficult to sell assets without a significant

²⁰ Given that not all financial institutions can have deposits at the Fed, and of those that can, not all are remunerated (the GSEs being the most notable example), limits to arbitrage due to counterparty risk may prevent the deposit rate from being a hard floor on the overnight rate. Establishing more uniform rules might help the Fed to improve control over the overnight rate.

²¹ The size of TAF and TSLF auctions has been reduced recently in response to flagging demand.

market impact. For instance, in the mortgage-backed securities market, even small sales of securities by the central bank could cause spreads to widen considerably and to undermine recovery in the housing market. Central banks could also hold these assets to maturity, which would help avoid capital losses and not jeopardize economic recovery.

40. In addition to mopping up liquidity through a contraction of central bank balance sheets, monetary policy could also be tightened through substitution on the liability side. In particular, central banks could raise reserve requirements, accept term deposits from commercial banks, issue central bank bills, or conduct reverse repos to reduce excess reserves, albeit subject to some constraints. Central banks could mandate banks to hold greater statutory reserves to mop up some of the liquidity, although it is likely that the requirement would have to be raised quite dramatically to make a serious dent. Alternatively, fiscal authorities could issue financial obligations, drawing liquidity from the banking system, and deposit proceeds at the central bank, as in the U.S. Supplementary Financing Program. However, the willingness of the Treasury to cooperate in such a program cannot be taken for granted, owing to political economy considerations, notably since such action would be seen as increasing gross government debt. Political consensus would also be required to allow central banks to issue their own bills where they do not already have such authority. Also, although such bills would absorb reserves from the banks, they could instead put in their hands an asset that could easily be used as collateral to draw more liquidity, including from the central bank. Reverse repos are standard central bank operations used to absorb liquidity, but conducting them on a massive scale may run into technical constraints—such as limited balance sheet capacity of primary dealers. These constraints, however, could be lifted by expanding the list of counterparties—as the Fed is planning to do by conducting reverse repo operations with money market mutual funds.

VI. CONCLUSION

41. A combination of a major deflationary shock and financial market distress has prompted G-7 central banks to cut policy rates to near zero and engage in unconventional monetary policy. Such measures included commitment to keeping interest rates low for an extended period of time, dramatic expansion of liquidity provision, purchases of long-term government bonds, and direct intervention in key credit markets.

42. The scale and scope of unconventional measures have differed substantially across major central banks. Most of them boosted significantly their liquidity operations, with the ECB being at the forefront in terms of the size, maturity, and collateral and counterparty eligibility. Massive asset purchases have boosted the size of the central bank balance sheets the most in the United States and the United Kingdom. However, the Bank of England has relied primarily on the purchases of government bonds, while the Fed has acquired a variety of assets, including commercial paper and mortgage-backed securities and providing financing for acquisition of other asset-backed securities. The reasons for this diversity

include differences in institutional arrangements, in the role of the banking system, in the degree of distress in financial markets, and in the assessment of economic prospects.

43. Central bank interventions, along with government actions, have been broadly successful in stabilizing financial conditions over time. While stress indicators remain at elevated levels, tail risks have declined dramatically and funding strains are easing. Ample liquidity provision helped avoid a meltdown in the financial system. Direct support of credit flows to borrowers and investors in disrupted markets and indirect support through broadening collateral eligibility requirements appear to have been successful in alleviating pressure and propping demand. On the other hand, purchases of government bonds seem to have had only temporary impact on treasury yields.

44. Although major industrial economies will need extraordinary support for some time, it is not too early to think about exit strategies. Unwinding unconventional measures will not be an easy task, and it requires a sensible plan, skillful execution, and clear communication. Many of the short-term facilities can be allowed—and have already started—to run their course when market conditions normalize, but unwinding the holdings of long-term securities may disrupt the markets. Central banks have effective tools for controlling monetary conditions even while their balance sheets remain expanded.

Table 1. Unconventional Measures Undertaken by G-7 Central Banks

| | Fed | BoJ | ECB | BoE | BoC |
|---|---|---|--|---|--|
| Commitment to keep policy rate low | Yes | No | No | No | Yes |
| Enhanced provision of liquidity to financial institutions | Yes TAF, PDCF, TSLF | Yes Broadened collateral; increased JGB purchases; introduced special funds-supplying operations | Yes Enhanced provision of long-term refi, broadened collateral | Yes Extended DW and OMO maturities; broadened collateral; introduced Special Liquidity Scheme | Yes Enhanced term PRA, introduced Term Loan Facility, broadened collateral |
| Provision of liquidity to credit markets | Yes CPFF, AMLF, MMIFF, MBS purchase program, TALF | Yes Outright purchases of commercial paper and corporate bonds (with remaining maturity under one year) | Yes Purchases of covered bonds | Yes Asset Purchase Facility (commercial paper and corporate bonds) | Yes Term PRA Facility for Private Sector Instruments |
| Purchase of long-term securities | Yes Treasuries and agency bonds | Yes Government bonds | No | Yes Gilts | No |

Table 2. Key Government Initiatives to Stabilize the Financial System

| | United States | Euro area | Japan | United Kingdom | Canada |
|---|---|--|--|---|--|
| Deposit Insurance | Increased insurance limit on individual accounts and introduced unlimited guarantee for non-interest-bearing business accounts | Increased the minimum deposit guarantee with permission to member states to offer higher guarantees | | Increased coverage for retail deposits | Some provinces provided higher or unlimited insurance of deposits in credit unions |
| Guarantees of bank liabilities | Temporary Liquidity Guarantee Program guarantees new senior debt of commercial banks, thrifts, and their holding companies | Numerous European countries announced bank debt guarantees, with fees varying across countries | | Introduced a Guarantee Scheme for certificates of deposit, commercial paper, and senior unsecured bonds and notes for any U.K.-incorporated bank or building society Introduced a guarantee program for new issuance of AAA-rated ABS | Introduced schemes for guaranteeing new senior wholesale borrowing by certain deposit-taking institutions and insurance companies |
| Guarantees of financial institution assets | Provided partial guarantees on the value of ring-fenced assets of Citigroup, Bank of America, and AIG Extended guarantee to money market mutual funds | Several countries provided partial guarantees of their banks' assets | Expanded public credit guarantees on banks' lending to SMEs | Under the Asset Protection Scheme the government guarantees portfolios of problematic assets on banks' balance sheets against large future losses; tentative arrangements with two banks (RBS and Lloyds) were reached in March, but have yet to be concluded Under the Working Capital and Enterprise Finance Guarantee Schemes the government provides partial guarantees on new bank lending to firms | |
| Loans to financial institutions | Extended credit lines to troubled financial institutions, such as AIG and (yet untapped) government-sponsored enterprises (GSEs) | | | | |
| Capital injection | Funds from various programs within TARP have been used to acquire non-voting, preferred shares in financial institutions Government acquires preferred shares in housing GSEs to keep their net worth positive | Many countries injected capital into financial institutions | Increased the size of funds set aside for capital injection | All U.K. banks and building societies are eligible for a recapitalization scheme to provide Tier 1 capital in the form of equity and preference shares at institution's request; two banks have received significant capital injections | Introduced authority for Minister of Finance to inject capital into troubled financial institutions |
| Asset purchases | Treasury purchases mortgage-backed securities Public-Private Investment Program will provide co-financing to private investors for purchases of legacy assets | Several countries established funds to purchase assets from banks or schemes for depositing impaired assets into "bad banks" | The government has submitted legislation to set up a separate corporation to purchase shares held by banks | The Special Liquidity Scheme allowed banks to swap temporarily illiquid assets of sufficiently high quality for gilts | The federal government purchases, via auctions, insured mortgage pools through the Canada Mortgage and Housing Corporation Canadian Secured Credit Facility purchases securities backed by loans and leases on vehicles and equipment |

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